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INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS  
AND NEXT-GENERATION NETWORKS

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**ITU-T Y.2000-series – Supplement on N-screen  
service scenarios for fixed mobile convergence**

ITU-T Y-series Recommendations – Supplement 24



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## Supplement 24 to ITU-T Y-series Recommendations

### ITU-T Y.2000-series – Supplement on N-screen service scenarios for fixed mobile convergence

#### Summary

One of the essential benefits of networks is their support for convergences such as the fixed mobile convergence (FMC) and telecom-broadcasting converged services like the Internet Protocol TV (IPTV), as highlighted in the ITU-T Y.2000-series supplements<sup>1</sup>. Supplement 24 to the ITU-T Y-series of Recommendations describes various N-screen service case scenarios for FMC. This supplement uses the features defined in Supplement 14 to the ITU-T Y-series of Recommendations (2011), *ITU-T Y.2000-series – Supplementary service scenarios for fixed-mobile convergence*.

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<sup>1</sup> Supplements 1, 3, 6, 7, 8, 9, 10, 13, 14, 15 and 24 of the ITU-T Y-series of Recommendations.

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## Supplement 24 to ITU-T Y-series Recommendations

### ITU-T Y.2000-series – Supplement on N-screen service scenarios for fixed mobile convergence

#### 1 Scope

This supplement provides N-screen service scenarios for fixed mobile convergence (FMC). These service scenarios are described using features of key elements of the FMC defined in [ITU-T Y-Sup.14].

This supplement covers the following areas:

- overview and general description of the N-screen services model
- service scenarios for N-screen services.

#### 2 References

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- [ITU-T Y-Sup.5] ITU-T Y-series Recommendations – Supplement 5 (2008), *ITU-T Y.1900-series – Supplement on IPTV service use cases*.
- [ITU-T Y-Sup.14] ITU-T Y-series Recommendations – Supplement 14 (2011), *ITU-T Y.2000-series – Supplementary service scenarios for fixed-mobile convergence*.
- [ITU-T Y-Sup.17] ITU-T Y-series Recommendations – Supplement 17 (2012), *ITU-T Y.2200-series – Functional model of a service overlay network framework which uses the next generation network*.

- [ITU-T Y-Sup.20] ITU-T Y-series Recommendations – Supplement 20 (2012), *ITU-T Y.1900-series – Supplement on scenarios and use cases of mobile IPTV.*
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<<http://www.itu.int/pub/T-FG-CLOUD-2012-P1>>
- [ITU-T FG Cloud TR-2] ITU-T Focus Group on Cloud Computing (2012), *Technical Report: Part 2: Functional requirements and reference architecture.*  
<<http://www.itu.int/pub/T-FG-CLOUD-2012-P2>>

### 3 Definitions

#### 3.1 Terms defined elsewhere

This supplement uses the following term defined elsewhere:

**3.1.1 fixed mobile convergence (FMC)** [ITU-T Q.1762]: In a given network configuration, the capabilities that provide services and application to the end user defined in [ITU-T Y.2091] regardless of the fixed or mobile access technologies being used and independent of the user's location. In the NGN environment [ITU-T Y.2011], it means to provide NGN services to end users regardless of the fixed or mobile access technologies being used.

#### 3.2 Terms defined in this supplement

This supplement defines the following terms:

**3.2.1 adaptive source multi-device (ASMD)**: An N-screen service that adjusts accordingly to several devices all using different contents.

**3.2.2 N-screen service**: An information sharing and content providing service on all network-enabled devices (TV, mobile phone, tablet, PC, home appliances and cars) that has a seamless and convenient manner.

**3.2.3 one source multi-use (OSMU)**: Sharing same contents or services on more than one screen among multiple kinds of screens.

### 4 Abbreviations and acronyms

This supplement uses the following abbreviations and acronyms:

Ad	Advertisement
AP	Access Point
ASMD	Adaptive Source Multi-Device
EPG	Electronic Programme Guide
FMC	Fixed Mobile Convergence
HD	High Definition
ICT	Information and Communication Technology
IPTV	Internet Protocol TV
OSMU	One Source Multi-Use
PMP	Portable Media Player
SD	Standard Definition

SDP	Service Delivery Platform
STB	Set Top Box
UI	User Interface
VOD	Video on Demand

## **5 Conventions**

None.

## **6 Overview**

Consumers are today increasingly using multiple devices at the same time. To meet demands, multi-device platforms enable users to enjoy the same contents or services seamlessly, irrespective of which device or medium is being used. The N-screen, which has recently been gaining attention, falls into the broader concept of a multi-device service. The N-screen is about enabling the user to use multiple devices, which means that it should be made up of integrated platforms for multi-devices. The core element of the N-screen service is a platform that mediates the use of contents or services on multiple devices.

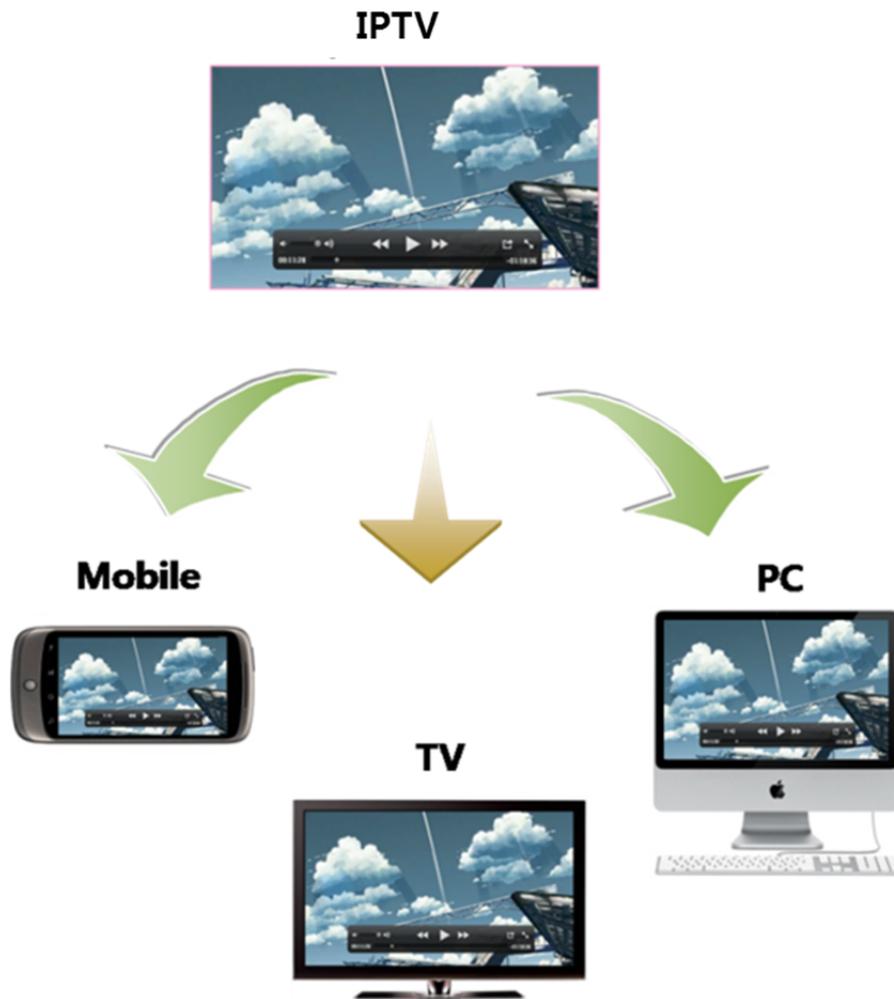
N-screen services and multi-device services are often used with the same meaning. Technically speaking, however, the multi-device service is a broader concept that encompasses the N-screen service. The multi-device service literally provides the same contents or services on a variety of devices. Along with the evolution of the ICT environment, multi-device services have also been evolving.

This supplement describes various kinds of N-screen service scenarios based on an overall scenario model for FMC [ITU-T Y-Sup.14]. A summary of [ITU-T Y-Sup.14] is shown in Appendix I.

## **7 General description of the N-screen services model**

It is by the introduction of the Internet Protocol (IPTV) and smart TV that broadcasting through Internet has been generalized. The bidirectional service was introduced into broadcasting by using the Internet's bidirectional transmission characteristic. Convergence services, combined with telecommunication, information, the web and personalized broadcasting services, then appeared. 'Intelligence' is a major feature of the smart TV, e.g., smart search, extraction and user interface (UI) technology providing customer-targeted information on the limited size of the TV screen. The N-screen service is a service of the smart TV, providing various kinds of bidirectional, converged, personalized and intelligent contents and services to multiple fixed or mobile devices.

The N-screen service scenarios can be classified into three cases. The first case (Case I) is the sharing of the same contents or services on more than one screen among multiple kinds of screens, as shown in Figure 7-1. For example, it is a service through which an end user can watch the same contents on various terminals, such as TVs with a service delivery platform (SDP) such as a set top box (STB), PCs, notebooks, portable media players (PMPs) or smart phones.



**Figure 7-1 – Case I of the N-screen service: one-source multi-use (OSMU) of media**

The second case (Case II) is continuously consuming the same contents on several devices as shown in Figure 7-2. It is considered to be one of the representative services supporting service mobility among multiple kinds of screens.



**Figure 7-2 – Case II of the N-screen service: Handover or shift**

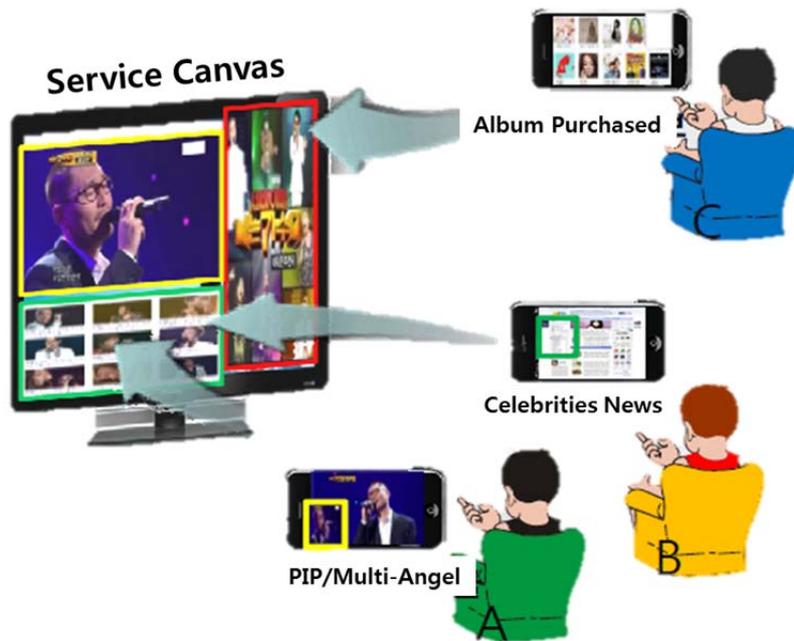
The third case (Case III) is providing a collaborating service among multiple devices as shown in Figure 7-3. The service provided to the customer consists of differently shaped contents that are accessed on separate screens. For example, a tablet PC operates as an electronic programme guide (EPG) terminal for an IPTV. A customer can select a programme and the selected programme is displayed on the TV screen in a synchronous manner.



**Figure 7-3 – Case III of the N-screen service: Collaboration among multiple devices**

A more advanced example of Case III collaboration is the adaptive source multi-device (ASMD) shown in Figure 7-4. In the ASMD service scenario, the user can divide and combine services to make a convergence service. In Figure 7-4, three people are watching TV on their own handheld devices, such as mobile phones and pads. When watching a music programme, each person uses a service related to the music programme. Person A is watching different angle scenes; Person B is viewing celebrity news about the singer shown on the TV screen; and Person C is viewing albums by the singer. By a touch on each person's handheld device, the services shown in each person's device are transmitted to the big TV screen and are displayed in combined mode.

This ASMD type of N-screen service will introduce a new watching pattern of the smart TV by providing collaboration among TV services and mobile devices. This will bring new business opportunities by providing convergence services freely combining broadcasting, telecommunications and web services.

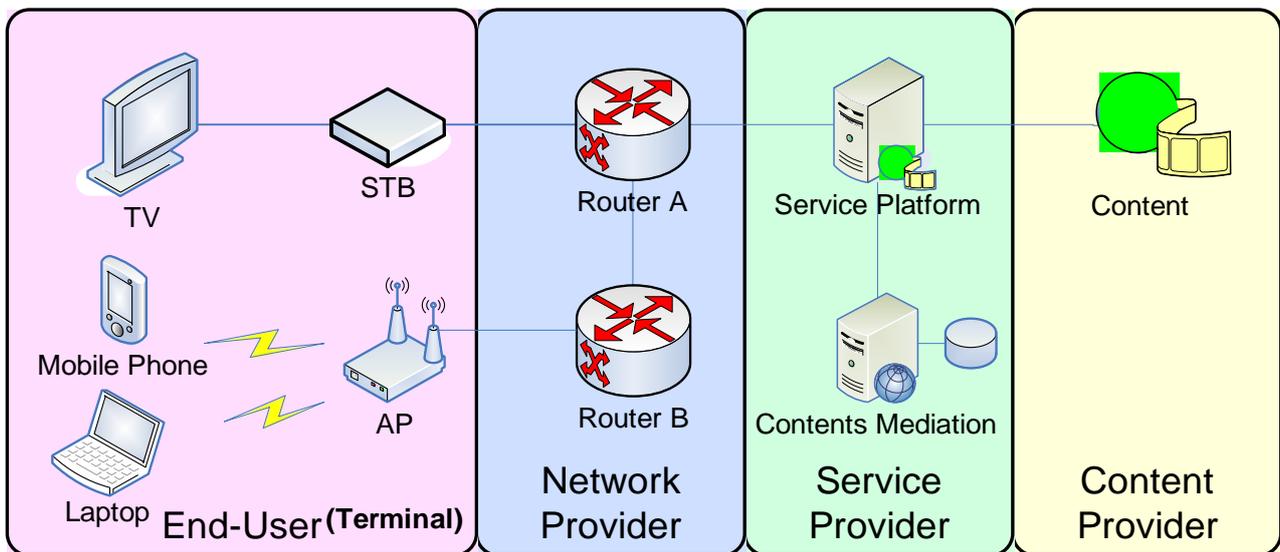


**Figure 7-4 – Case III of N-screen service: Collaboration through ASMD**

**8 Scenario for N-screen service Case I: Watching the same content on various terminals**

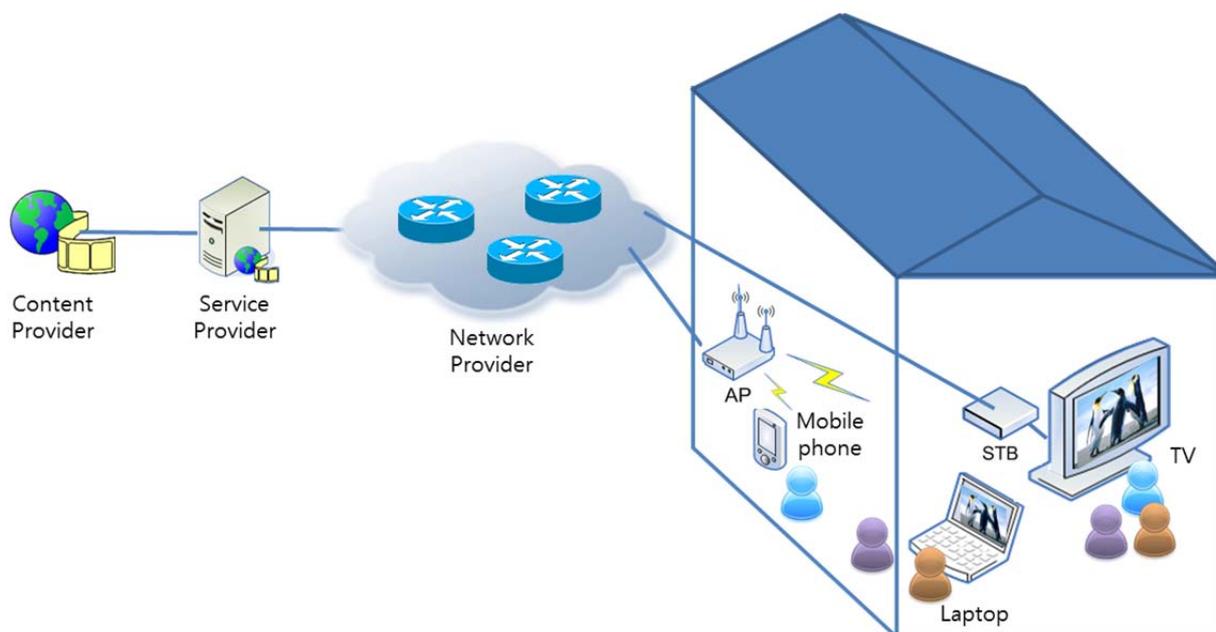
**8.1 General description and use cases**

Case I N-screen is a service in which an end user can watch the same contents on various terminals, such as TVs with STB, PCs, notebooks, PMPs or smart phones. Each terminal screen is used in a cooperative and synchronous manner.



**Figure 8-1 – Overall configuration of N-screen case watching same content**

There is a description of the three-screen service that is a use case of the N-screen service in clause 8.1 of [ITU-T Y-Sup.20]. Figure 8-2 is a three-screen service with content sharing. The three-screen service allows an IPTV service subscriber to consume IPTV service contents on TV, PC and wireless screens. The basic type of three-screen service is sharing the same IPTV service contents on more than one screen among three kinds of screens.



**Figure 8-2 – Three-screen service with content sharing**

## **8.2 Service scenarios and mapping: Watching the same content on various terminals**

### **8.2.1 Service scenarios of N-screen service case watching same content on multi-devices**

#### **1. [Service provider > End user (person): Watching N-screen service on Terminal A]**

An end user (person) is watching contents provided by content delivery functions of a service provider via network functions of a network provider using Terminal A (for example, a TV with a set-top box (STB)). The end user may have a plan to watch the content using Terminal B (for example, a laptop) and Terminal C (for example, a mobile phone) at the same time.

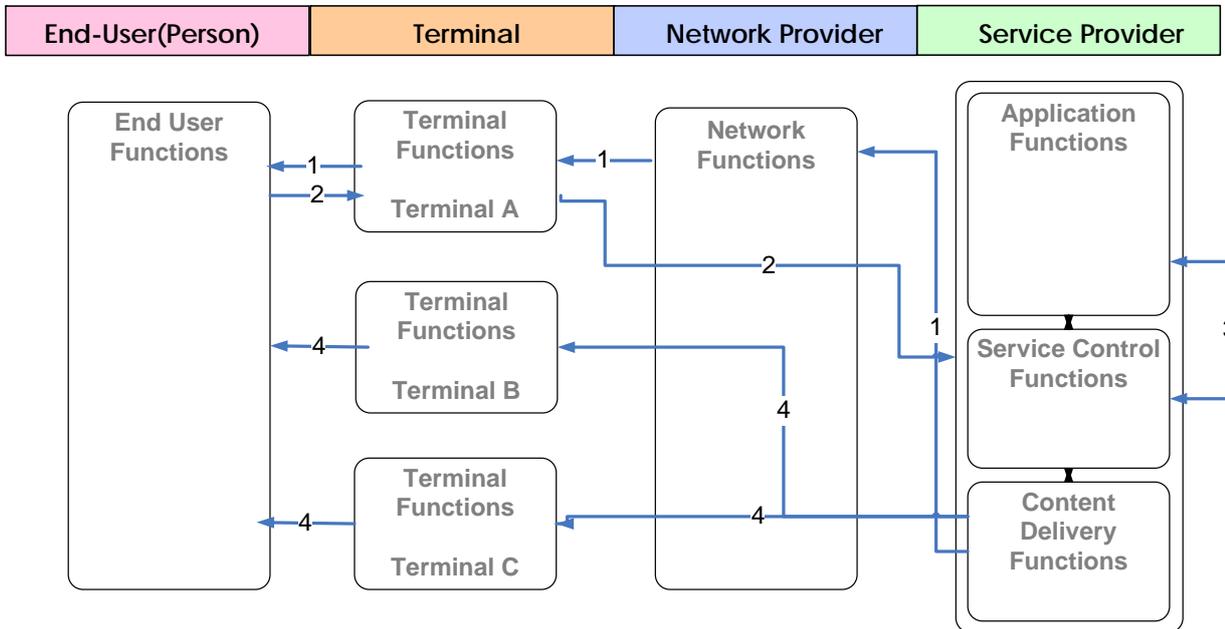
#### **2. [End user (person) → Service provider: Requesting N-screen service to Terminals B and C]**

End-user functions of the end-user request the terminal to provide current service to Terminal B.

#### **3. [Service provider: Preparing N-screen service for Terminals B and C]**

The N-screen service request to display the same content as Terminal A on Terminals B and C is processed by the service provider's service control function. The service control functions of the service provider adjust the quality of contents to network bandwidth to be changed. The service control functions decide to transcode the original contents into suitable contents to be changed, considering display sizes to be changed. The application functions of the service provider may have contents mediation functions like codec convertors. The application functions convert content into small-size or big-size display, depending on the device profile and access network bandwidths.

4. [Service provider → Terminals B and C → End user (person): using N-screen service]  
 The newly-generated contents are delivered into designated storage managed by content delivery functions. The content delivery functions send adjusted contents to Terminals B and C.



**Figure 8-3 – Service scenario for the case of N-screen watching same content**

**8.2.2 Mapping service scenario for the case of N-screen watching same content with FMC scenarios**

The following are mappings of service scenarios in the case of N-screen watching the same content on multi-devices and FMC scenarios described in clause 8.2 of [ITU-T Y-Sup.14]. These mappings help to identify the features of each scenario and the details for supporting N-screen service Case I, watching the same content over FMC.

- FMC Scenario I, ①, ②, ③, ④: N-screen Case I (OSMU) Scenario 1
- FMC Scenario ⑤: N-screen Case I (OSMU) Scenario 2, 4
- FMC Scenario ⑥: N-screen Case I (OSMU) Scenario 3, 4
- FMC Scenario ⑦: N-screen Case I (OSMU) Scenario 1, 2
- FMC Scenario ⑧: N-screen Case I (OSMU) Scenario 3
- FMC Scenario ⑨, ⑩, ⑪, ⑫: N-screen Case I (OSMU) Scenario 4

Mapping in the view of N-Screen Case I (OSMU) Scenario:

- N-screen Case I (OSMU) Scenario 1: FMC Scenario I, ①, ②, ③, ④
- N-screen Case I (OSMU) Scenario 2: FMC Scenario ⑤, ⑥
- N-screen Case I (OSMU) Scenario 3: FMC Scenario ⑦, ⑧
- N-screen Case I (OSMU) Scenario 4: FMC Scenario ⑨, ⑩, ⑪, ⑫, ⑬, ⑭

Mapping in table view:

FMC\OSMU	1	2	3	4
①	O	O		
②				O
③				O
⑥				O
A	O			
B		O		O
a	O			
b			O	O
c			O	
e				O
I	O			

## 9 Scenario for N-screen service Case II Scenario 1: Continuous use of same content

### 9.1 General description and use cases

There is a description of a three-screen service with mobility, that is a use case of the N-screen service using the same content continuously, in clause 8.1.23 of [ITU-T Y-Sup.20]. Figure 9-1 describes a three-screen service with service continuity.

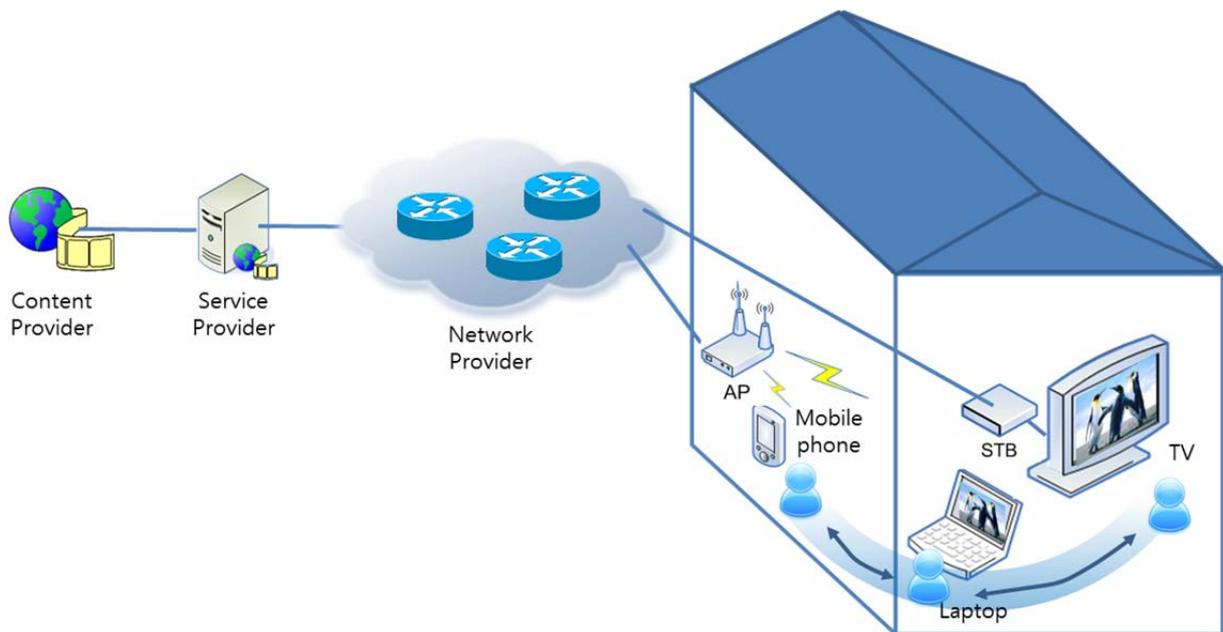


Figure 9-1 – Three-screen service with service continuity

## **9.2 Service scenarios and mapping: Consuming the same content on multi-devices continuously**

### **9.2.1 Service scenarios of N-screen service case consuming the same content on multi-devices continuously**

#### **1. [Service provider → End user (person): Watching N-screen service on Terminal A]**

An end user (person) is watching contents provided by content delivery functions of a service provider via network functions of a network provider using Terminal A (for example, a TV with STB in a living room).

#### **2. [End user (person): Moving N-screen service on Terminal B]**

The end user moves from living room to Room A to watch the same content continuously using Terminal B (for example, a laptop).

#### **3. [Terminal B → Service provider: Requesting N-screen service to Terminal B]**

Terminal B is authenticated as an N-screen service and requests the service provider to send the same content.

#### **4. [Service provider: Preparing the N-screen service for Terminal B]**

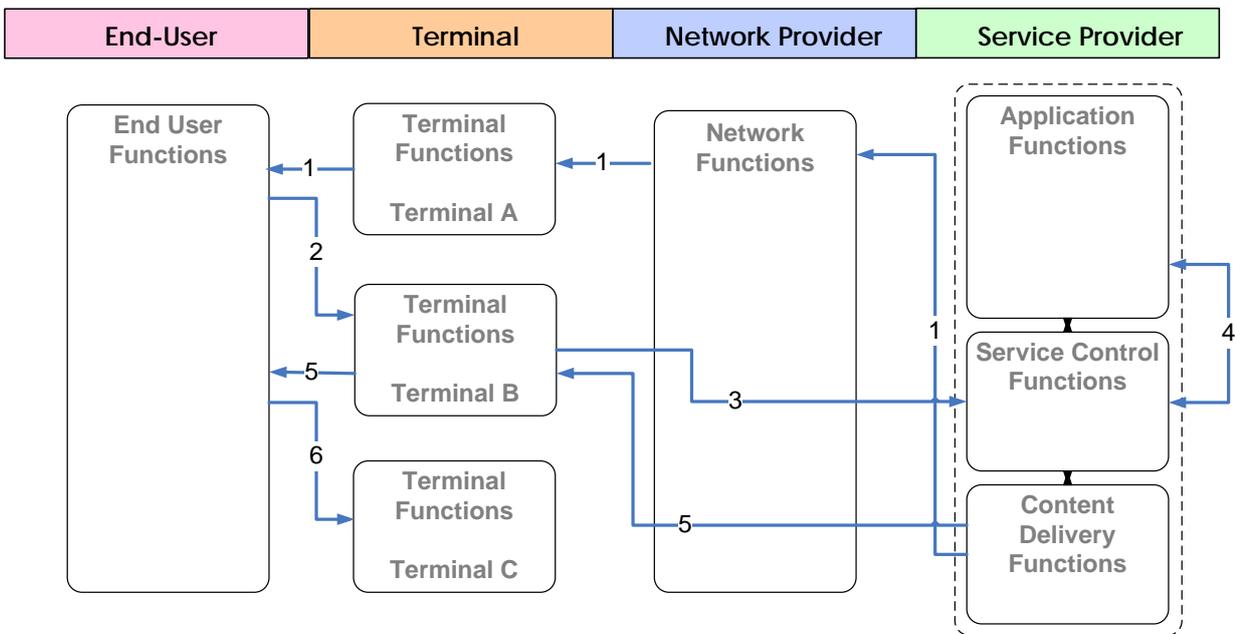
The N-screen service requested to display the same content continuously on the Terminal B is processed by the service provider's service control function. The service control functions of the service provider adjust the quality of contents to the network bandwidth to be changed. The service control functions decide to transcode the original contents into suitable contents to be changed, considering display sizes to be changed. Application functions of the service provider may have contents mediation functions like codec convertors. The application functions converts content into small-size or big-size display, depending on the device profile and access network bandwidths.

#### **5. [Service provider → Terminal B → End user (person): Using N-screen service]**

The newly-generated contents are delivered into designated storage managed by content delivery functions. The content delivery functions send adjusted contents to Terminal B.

#### **6. [End user (person): Moving N-screen service on Terminal C]**

The end user moves from Room A to Room B to watch the same content continuously using Terminal C (for example, a cellular phone). The Terminal C shows the same content continuously through the same process as described above.



**Figure 9-2 – Service scenario of N-screen case consuming the same content on multi-devices continuously**

### 9.2.2 Mapping N-screen service: Continuous use of same contents scenarios (service continuity) with FMC scenarios

The following are mappings of service scenarios of N-screen Case II: Continuous use of same contents on single or multi-devices and FMC scenarios described in clause 8.2 of [ITU-T Y-Sup.14]. These mappings help to identify features of each scenario and the details for supporting N-screen service Case II: consuming same content on multi-devices continuously (service continuity) over FMC.

- FMC Scenario ①: N-screen service Case II (Service continuity) Scenario 1
- FMC Scenario ②: N-screen service Case II (Service continuity) Scenario 5
- FMC Scenario ③: N-screen service Case II (Service continuity) Scenario 5
- FMC Scenario ⑤: N-screen service Case II (Service continuity) Scenario 2, 6
- FMC Scenario ⑥: N-screen service Case II (Service continuity) Scenario 5, 6
- FMC Scenario ①: N-screen service Case II (Service continuity) Scenario 1
- FMC Scenario ②: N-screen service Case II (Service continuity) Scenario 2, 3, 5
- FMC Scenario ③: N-screen service Case II (Service continuity) Scenario 6
- FMC Scenario ④: N-screen service Case II (Service continuity) Scenario 1
- FMC Scenario ⑤: N-screen service Case II (Service continuity) Scenario 4, 5
- FMC Scenario ⑥: N-screen service Case II (Service continuity) Scenario 4
- FMC Scenario ⑦: N-screen service Case II (Service continuity) Scenario 5
- FMC Scenario I: N-screen service Case II (Service continuity) Scenario 1

Mapping in the view of N-screen service Case II (Service continuity) Scenario:

- N-screen service Case II (Service continuity) Scenario 1: FMC Scenario I, ①, ②, ③
- N-screen service Case II (Service continuity) Scenario 2: FMC Scenario ④, ⑤, ⑥
- N-screen service Case II (Service continuity) Scenario 3: FMC Scenario ⑦

- N-screen service Case II (Service continuity) Scenario 4: FMC Scenario ①, ③
- N-screen service Case II (Service continuity) Scenario 5: FMC Scenario ②, ④, ⑤, ⑥, ⑦, ⑧, ⑨, ⑩, ⑪, ⑫, ⑬, ⑭, ⑮, ⑯, ⑰, ⑱, ⑲, ⑳, ㉑, ㉒, ㉓, ㉔, ㉕, ㉖, ㉗, ㉘, ㉙, ㉚, ㉛, ㉜, ㉝, ㉞, ㉟, ㊱, ㊲, ㊳, ㊴, ㊵, ㊶, ㊷, ㊸, ㊹, ㊺, ㊻, ㊼, ㊽, ㊾, ㊿, ①, ②, ③, ④, ⑤, ⑥, ⑦, ⑧, ⑨, ⑩, ⑪, ⑫, ⑬, ⑭, ⑮, ⑯, ⑰, ⑱, ⑲, ⑳, ㉑, ㉒, ㉓, ㉔, ㉕, ㉖, ㉗, ㉘, ㉙, ㉚, ㉛, ㉜, ㉝, ㉞, ㉟, ㊱, ㊲, ㊳, ㊴, ㊵, ㊶, ㊷, ㊸, ㊹, ㊺, ㊻, ㊼, ㊽, ㊾, ㊿
- N-screen service Case II (Service continuity) Scenario 6: FMC Scenario ⑤, ⑥, ⑩

Mapping in table view:

FMC\Service continuity	1	2	3	4	5	6
①	O					
②					O	
③					O	
⑤		O				O
⑥					O	O
⑩	O					
⑫		O		O	O	
⑰						O
㉑	O					
㉒				O	O	
㉓				O		
㉔					O	
I	O					

## 10 Scenario for N-screen service Case II Scenario 2: Based on cloud computing

### 10.1 General description

There is a description of the cloud computing service with content sharing that is a use case of N-screen service cases using the same content continuously in clause 8.1.3 of [ITU-T Y-Sup.20]. Figure 10-1 shows the three-screen service with service continuity using the cloud computing service.

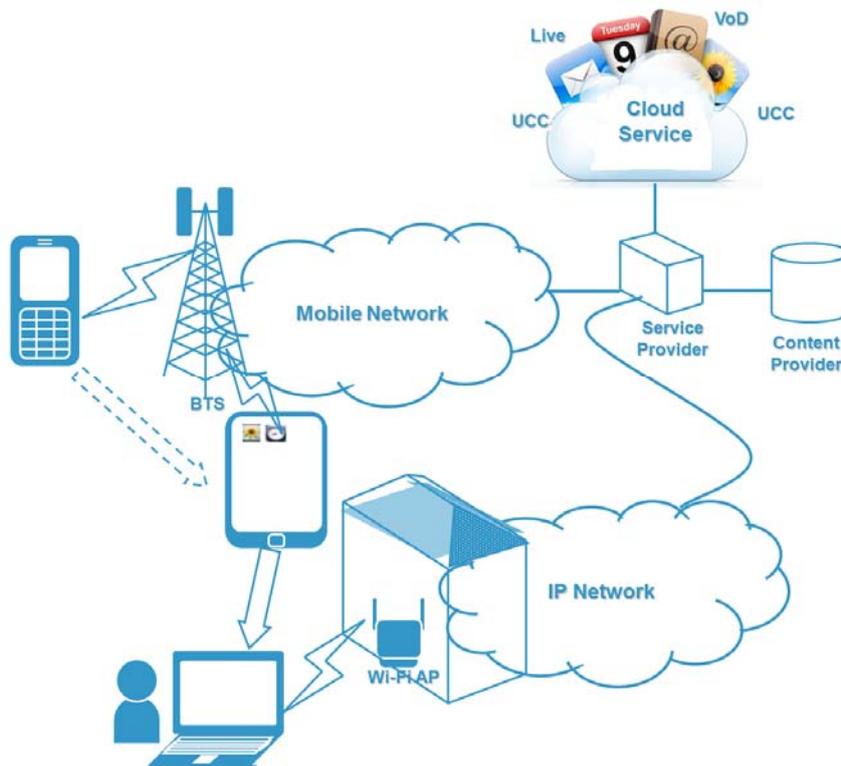


Figure 10-1 – Cloud computing service with contents sharing

## 10.2 Service scenarios and mapping: Consuming the same content on multi-devices continuously

### 10.2.1 Service scenarios of N-screen service case consuming the same content using cloud computing service on multi-devices continuously

#### 1. [Service provider → End user (person): Watching the N-screen service using the cloud computing service on Terminal A]

An end user (person) is watching contents provided by content delivery functions of a service provider with the cloud computing service via network functions of a network provider using the terminal (for example, a smartphone). If the user wants a service related to the contents, the service provider can support it using the cloud computing service for more efficiency and control, or create an additional service using [ITU-T Y-Sup.17]. At handover, the end user is supplied with new channel access information for service continuity. If an error has occurred in network functions, then the IT resources can be moved to another location to solve the problem. Otherwise, if the problem is caused by IT resources, the IT resources can be re-allocated with unused IT resources for cloud computing service.

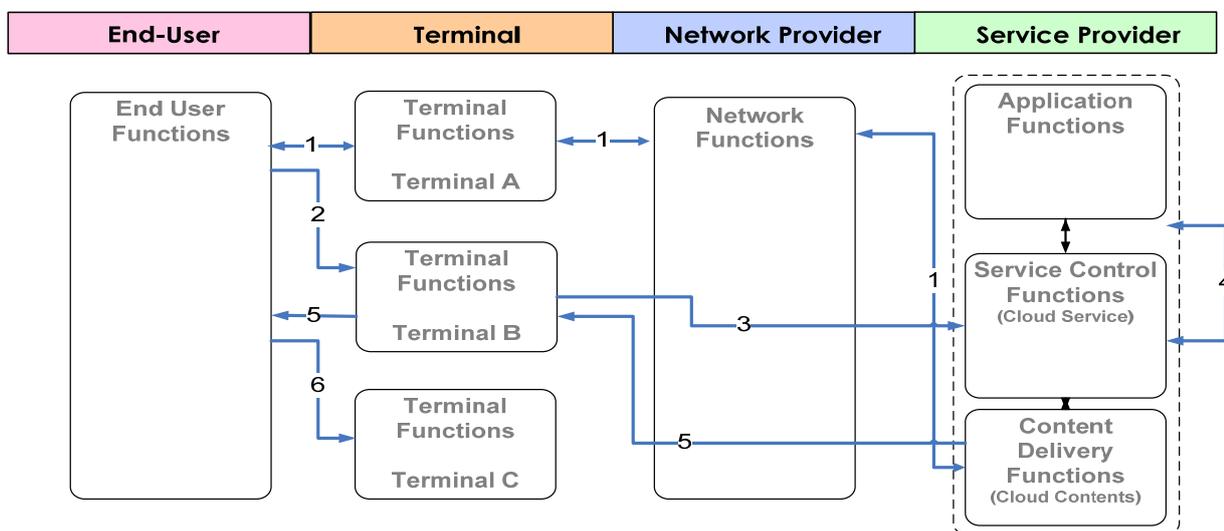
#### 2. [End user (person): Moving N-screen service on Terminal B]

The end user moves from office to coffee shop to watch the same content continuously using Terminal B (for example, a notepad computer).

#### 3. [Terminal B → Service provider: Request N-screen service to Terminal B]

Terminal B is authenticated as an N-screen service and requests the service provider with a cloud computing service to send the same content.

4. **[Service provider: Preparing the N-screen service for Terminal B]**  
 The N-screen service requested to display the same content continuously on the Terminal B is processed by the service provider's service control function. By using the cloud computing service capability, the service control functions of the service provider adjust the quality of contents to the network bandwidth to be changed, and also the service control functions decide to transcode the origin contents into suitable contents to be changed, considering display sizes to be changed.
5. **[Service provider → Terminal B → End user (person): using N-screen service]**  
 The newly-generated contents using the cloud computing service are delivered into designated storage managed by content delivery functions. The content delivery functions send adjusted contents to Terminal B.
6. **[End user (person): Moving the N-screen service on Terminal C]**  
 The end user moves from the coffee shop to home to watch the same content continuously using Terminal C (for example, a laptop PC). The same content using the cloud service for and end user with Terminal C is delivered to Terminal C by content delivery functions.



**Figure 10-2 – Service scenario of N-screen case consuming same content using cloud computing service on multi-devices continuously**

### 10.2.2 Mapping service scenario of N-screen service case consuming same content using cloud computing service with FMC scenarios

The following are mappings of service scenarios of N-screen case watching the same content on multi-devices using cloud computing with FMC scenarios which are described in clause 8.2 of ITU-T Y-Sup.14]. This mapping helps to identify features of each scenario with details for supporting the N-screen service Case I based on cloud computing, watching the same content over FMC.

- FMC Scenario I: N-screen Case I (Cloud) Scenarios 1, 3, 4
- FMC Scenario ①: N-screen Case I (Cloud) Scenarios 1, 3, 5, 6
- FMC Scenario ②: N-screen Case I (Cloud) Scenario 5
- FMC Scenario ③: N-screen Case I (Cloud) Scenario 1
- FMC Scenario ④: N-screen Case I (Cloud) Scenarios 3, 4, 5
- FMC Scenario ⑤: N-screen Case I (Cloud) Scenario 1
- FMC Scenario ⑥: N-screen Case I (Cloud) Scenarios 2, 6

Mapping in the view of N-screen Case I (Cloud) based on a cloud computing scenario:

- N-screen Case I (Cloud) Scenario 1: FMC Scenario I, (a), (A), ①
- N-screen Case I (Cloud) Scenario 2: FMC Scenario ②
- N-screen Case I (Cloud) Scenario 3: FMC Scenario (A), (b), I
- N-screen Case I (Cloud) Scenario 4: FMC Scenario I, (b)
- N-screen Case I (Cloud) Scenario 5: FMC Scenario (b), (A), (B)
- N-screen Case I (Cloud) Scenario 6: FMC Scenario ②, (A)

Mapping in table view:

FMC\Cloud N-screen	1	2	3	4	5	6
①	O					
②		O				O
(A)	O		O		O	O
(B)					O	
(a)	O					
(b)			O	O	O	
I	O		O	O		

## 11 Scenario for N-screen service Case III Scenario 1: Targeted advertising service to separate terminal

### 11.1 General description

The targeted advertisement service provides ads to a person's mobile terminal while the person is watching a video on demand (VOD) film on the TV screen. While watching a VOD channel, logging in and keyword selection may be required to initiate the service. Choosing 'keyword' plus 'interests' from menus may load ad service web pages, which gather related ad contents and metadata from the web and third-party ad servers. The login user's interests are dependent on the user profile. If the keyword belongs to 'people', the person may appear in an aggregated commercial advertisement. As supplementary ads, a banner advertisement, which is inserted at the advertiser's request, is located near the targeted advertising service or other convergence services.

### 11.2 Service scenarios and mapping: Targeted advertising service to separate terminal

#### 11.2.1 Service scenarios of N-screen service case collaborating convergence service: Targeted advertising service to separate terminal

##### 1. [Service provider → End user (person): Watching VOD channel on Terminal A]

The end user (person) is watching a VOD channel with an ad service which is provided with content delivery functions of the service provider via network functions of the network provider using Terminal A (for example, a TV with set top box). Let us suppose that the end user with Terminal A is a woman in her forties and she likes to collect jewellery.

2. **[End user (person) → Service provider: Initiate the targeted advertisement service on Terminal A]**

The end user can log in and select a keyword to initiate the targeted advertisement service. By choosing 'keyword' plus 'interests' on the menus of Terminal A, related ad contents and metadata from the web and third party ad server is gathered by the service control functions of the service provider.

3. **[Service provider: Preparing and generating targeted web pages for Terminal A]**

Targeted advertising content is generated with gathering ad contents, metadata and profile information of the end user with Terminal A.

4. **[Service provider → Terminal A → End user (person): using targeted advertised service with Terminal A]**

The newly generated content which has targeted information (for example, jewellery shops) for end user with Terminal A is delivered to Terminal A by content delivery functions.

5. **[End user (person) → Service provider: Initiate targeted advertisement service on Terminal B]**

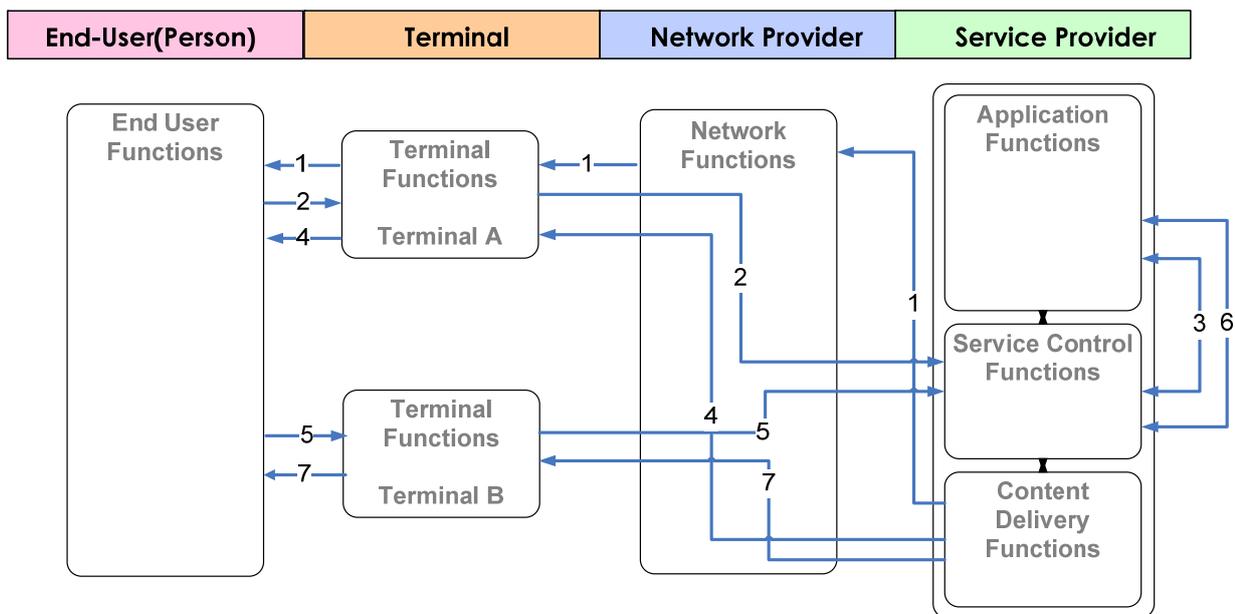
The end user (person) has a hand-held device such as a smartphone. He lives with his mother who is an end user using Terminal A. Let us suppose that the end user with Terminal B is a man in his twenties and he is very interested in cars. He can also initiate a targeted advertising service by log in and selecting a keyword. At this time, the user profile information of the end user with Terminal B is transmitted to the service control functions of the service provider. Related ad contents and metadata for the end user with Terminal B from web and third-party ad server is also gathered by the service control functions of the service provider.

6. **[Service provider: Preparing and generating targeted web pages for Terminal B]**

Targeted advertising content is generated by gathering ad contents, metadata and profile information of the end user with Terminal B.

7. **[Service provider → Terminal A → End user (person): Using targeted advertised service with Terminal B]**

The newly-generated content which has targeted information (for example, car ads) for the end user with Terminal B is delivered to Terminal B by content delivery functions.



**Figure 11-1 – Service scenario of N-screen case using targeted advertising service**

### 11.2.2 Mapping N-screen targeted advertising service scenarios with FMC scenarios

The following are mappings of service scenarios of N-screen Case III: N-screen targeted advertising service scenarios and FMC scenarios described in clause 8.2 of [ITU-T-Sup.14]. These mappings help to identify features of each scenario and the details for supporting the N-screen service Case III: targeted advertising service to separate terminal over FMC.

- FMC Scenario ①: N-screen service Case III (targeted advertising) Scenario 1, 2, 4, 5, 7
- FMC Scenario ④: N-screen service Case III (targeted advertising) Scenario 1, 4
- FMC Scenario ⑤: N-screen service Case III (targeted advertising) Scenario 2, 5, 7
- FMC Scenario ⑥: N-screen service Case III (targeted advertising) Scenario 1, 4
- FMC Scenario ⑦: N-screen service Case III (targeted advertising) Scenario 3, 6
- FMC Scenario ⑧: N-screen service Case III (targeted advertising) Scenario 3, 6, 7
- FMC Scenario I: N-screen service Case III (targeted advertising) Scenario 1
- FMC Scenario II: N-screen service Case III (targeted advertising) Scenario 4, 7

Mapping in the view of N-screen service Case III (targeted advertising) Scenario:

- N-screen service Case III (targeted advertising) Scenario 1: FMC Scenario I, ⑥, ④, ①
- N-screen service Case III (targeted advertising) Scenario 2: FMC Scenario ①, ⑤
- N-screen service Case III (targeted advertising) Scenario 3: FMC Scenario ⑦, ⑧
- N-screen service Case III (targeted advertising) Scenario 4: FMC Scenario II, ⑥, ④, ①
- N-screen service Case III (targeted advertising) Scenario 5: FMC Scenario ①, ⑤
- N-screen service Case III (targeted advertising) Scenario 6: FMC Scenario ⑦, ⑧
- N-screen service Case III (targeted advertising) Scenario 7: FMC Scenario II, ⑧, ⑤, ①

Mapping in table view:

FMC\targeted advertising	1	2	3	4	5	6	7
①	O	O		O	O		O
Ⓐ	O			O			
Ⓑ		O			O		O
Ⓐ	O			O			
Ⓑ			O			O	
Ⓒ			O			O	O
I	O						
II				O			O

### 11.3 Functional models and procedures

Figure 11-2 shows the targeted advertising service model applied to IPTV. While customers are watching a VOD or real-time channel service, an advertisement is sent to the user's smartphone that is prepared according to contents and customer properties such as VOD's actor, user's sex, age, etc.

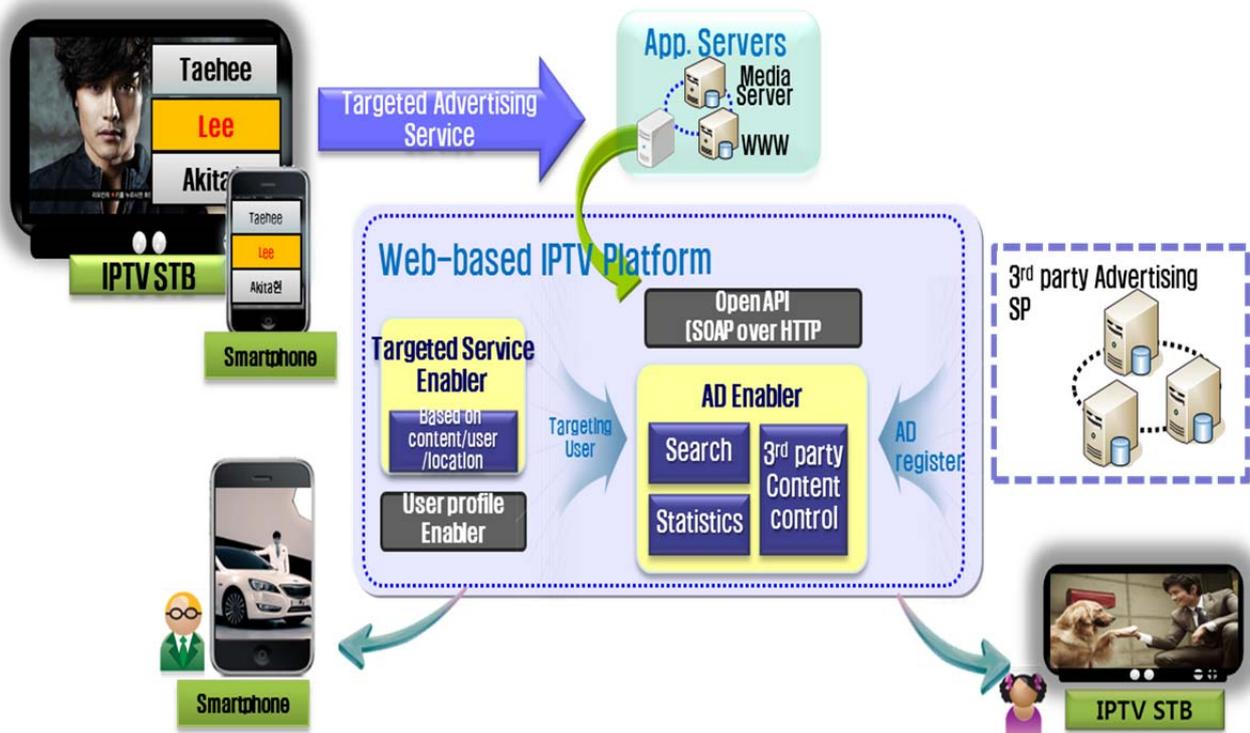
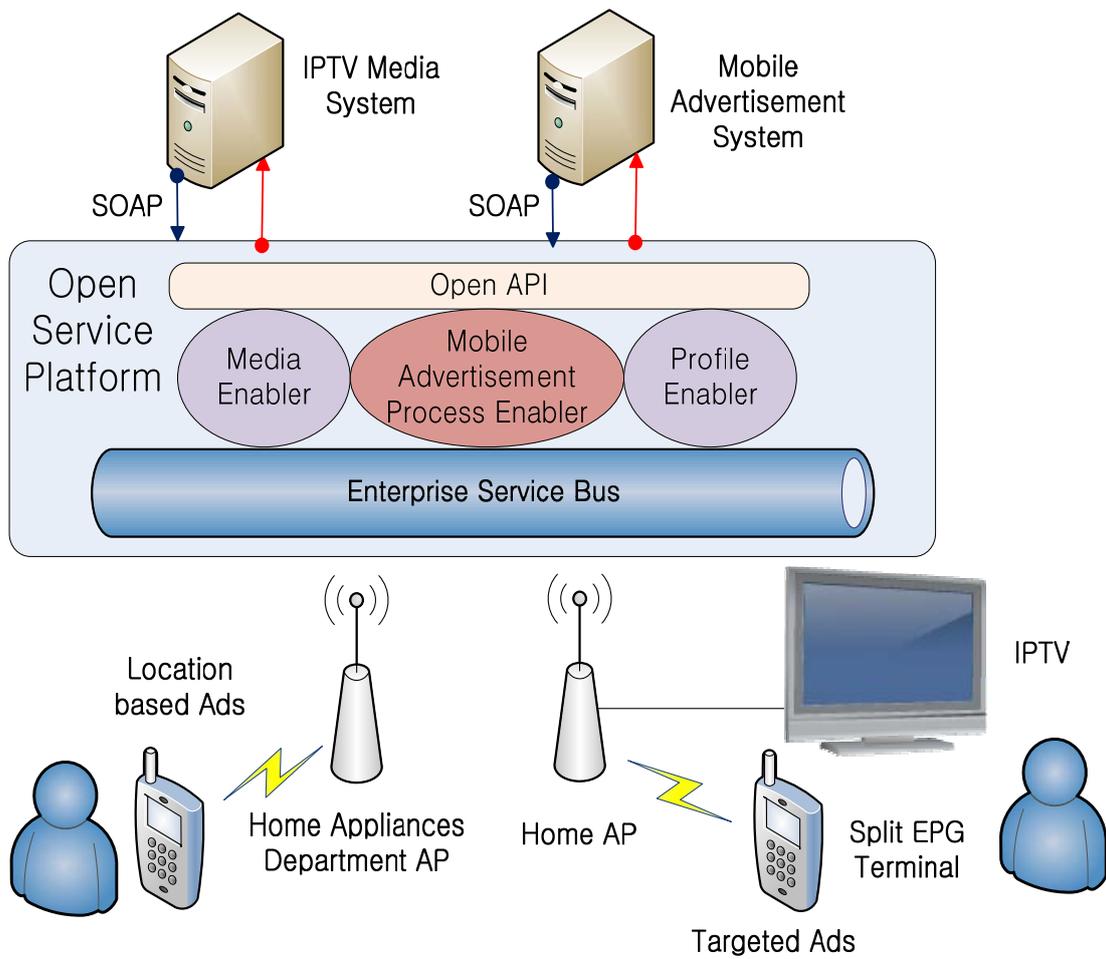
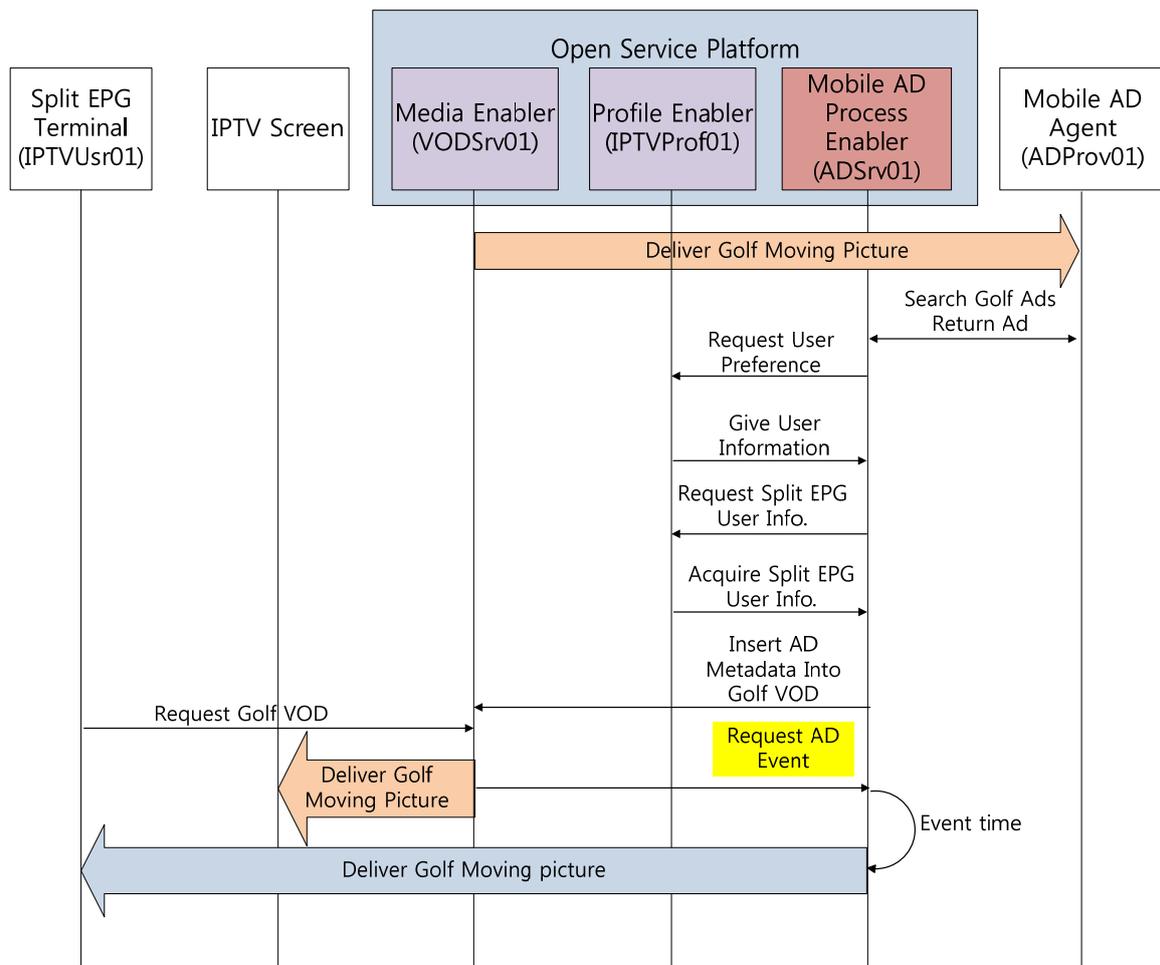


Figure 11-2 – Targeted advertising service



**Figure 11-3 – Example system of a targeted advertising service**



**Figure 11-4 – Service flows of a targeted advertising service**

The split electronic programme guide (EPG) terminal has the function to control the IPTV service via the home access point (AP). A mobile user on the right of Figure 11-3 watches a golf sports channel with a VOD service. He already gave his preference to the profile enabler via the open service platform. For instance, since the profile enabler knows he enjoys golf, when it detects a golf driver's appearance while viewing golf contents, the mobile ad process enabler may give him a moving picture advertisement about a newly-released golf driver. The mobile ad process enabler may give helpful information to him as well as a connection to the purchase step through a mobile device.

Figure 11-4 shows an example of targeted advertisement using an SDP. The mobile ad agent may be a person or a sub-system of an ad service provider. He also watches a golf VOD service via a media enabler within an open service platform. The mobile ad process enabler searches a golf ad among the many ad contents of a mobile ad agent. That golf ad is related to the product shown in the golf moving picture. The mobile ad process enabler acquires information concerning user preference and whether mobile users own split EPG terminals. The convergence enabler then inserts ad metadata into the golf VOD. A mobile user with a split EPG terminal requests the open service platform to view the golf contents. As soon as the golf moving picture is delivered to an IPTV user, an ad request event is generated.

## 12 Scenario for N-screen service Case III Scenario 2: Collaborative N-screen service, mobile EPG

### 12.1 General description of scenario for N-screen service Case III: Collaborative N-screen service, mobile EPG

The mobile EPG service provides an optional IPTV contents service to the end user's terminal while he is watching IPTV contents on a TV screen. While watching IPTV contents, the end user requests content information of the current IPTV service; for example, IPTV content EPG, through an IPTV service app. on his mobile device. The requested contents information list delivered to the end user must be synchronized to IPTV contents currently being provided to the end user's TV screen. After skimming through the IPTV content information, the end user selects a new IPTV content which he wants to play from content information listed on his mobile device and requests new IPTV content. The requested IPTV content is delivered to the end user and he can start to watch the newly requested IPTV content on his TV screen.

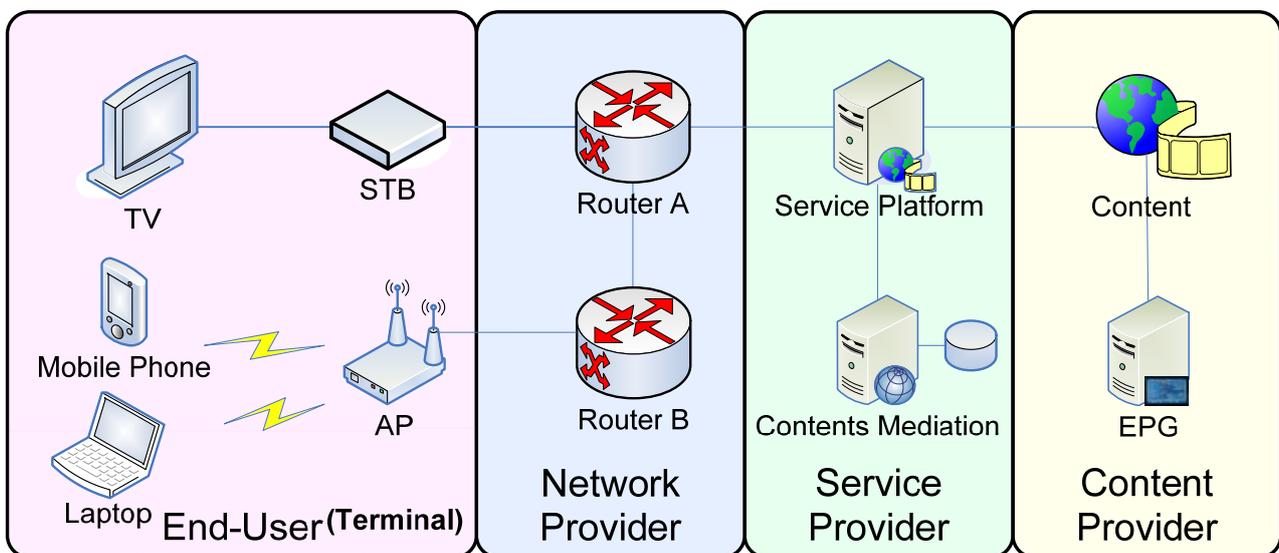


Figure 12-1 – Overall configuration of N-screen case: Mobile EPG

### 12.2 Service scenario and mapping: Collaborative N-screen service: mobile EPG

#### 12.2.1 Service scenarios of N-screen service Case III: Collaborative N-screen service: mobile EPG

1. **[Service provider → Terminal A → End user (person): Watching IPTV content on Terminal A]**

The end user is watching IPTV contents provided by content delivery functions of a service provider via network functions of a network provider using Terminal A. The end user has a mobile device and application which can list out the current IPTV contents information.

2. **[End user (person) → Terminal B → Service provider: Requesting EPG service on Terminal B]**

the end user requests service information of current IPTV contents displayed on Terminal A through using Terminal B (for example, a mobile device or an IPTV service EPG app.).

3. **[Service provider → Terminal B → End user (person): Providing EPG information to Terminal B]**

The service provider decides to provide requested contents information to the end user, considering the content accessibility, device profile, and network conditions for Terminal A. The service control function of the service provider requests to send the

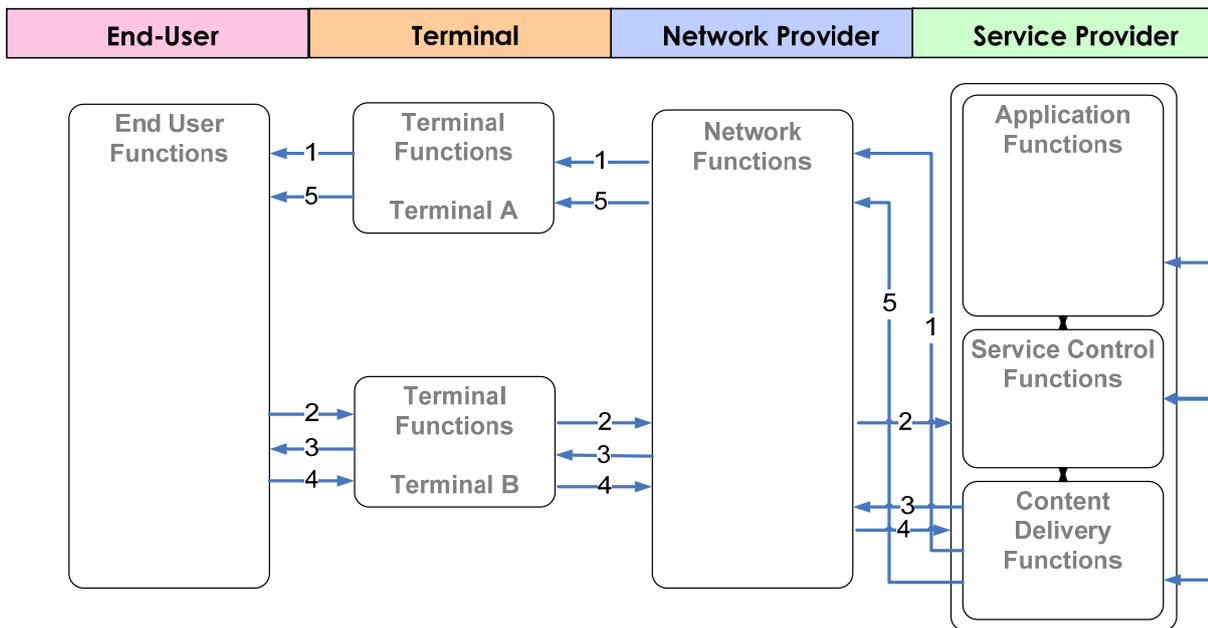
current content information lists played out for Terminal A to Terminal B. Application functions of the service provider prepares the current contents information (for example, programme lists or content EPG) to be provided to the end user. The content delivery functions send contents information to Terminal B.

4. **[End user (person) → Terminal B → Service provider: Select content]**

The end user selects new IPTV contents from contents information (for example, content EPG) listed on Terminal B and requests new IPTV content which is displayed on Terminal A to the service provider via network functions of a network provider using Terminal B.

5. **[Service provider → Terminal A → End user (person)]**

The newly requested contents are delivered to Terminal A via network functions of network provider and content delivery functions of service provider.



**Figure 12-2 – Service scenario of mobile EPG**

**12.2.2 Mapping of N-screen service mobile EPG scenarios with FMC scenarios**

The following are mappings of N-screen service mobile EPG scenarios and FMC scenarios described in clause 8.2 of [ITU-T Y-Sup.14]. These mappings help to identify features of each scenario and the details for supporting N-screen service mobile EPG, watching the same content over FMC.

- FMC Scenario I, ①, ②: N-screen service Case III (mobile EPG) Scenario 1
- FMC Scenario ③: N-screen service Case III (mobile EPG) Scenario 2, 3, 4, 5
- FMC Scenario ④: N-screen service Case III (mobile EPG) Scenario 3, 5
- FMC Scenario ⑤: N-screen service Case III (mobile EPG) Scenario 1, 2, 4
- FMC Scenario ⑥: N-screen service Case III (mobile EPG) Scenario 3
- FMC Scenario ⑦, ⑧, ⑨, ⑩: N-screen service Case III (mobile EPG) Scenario 3, 5

Mapping in the view of N-screen case (mobile EPG) Scenario:

- N-screen service Case III (mobile EPG) Scenario 1: FMC Scenario I, ①, ②, ⑤
- N-screen service Case III (mobile EPG) Scenario 2: FMC Scenario ⑤, ⑩, ③

- N-screen service Case III (mobile EPG) Scenario 3: FMC Scenario ②, ③, ⑥, ①, ④, ⑤
- N-screen service Case III (mobile EPG) Scenario 4: FMC Scenario ①, ⑥, ③
- N-screen service Case III (mobile EPG) Scenario 5: FMC Scenario ②, ③, ⑥, ①, ④, ⑤

Mapping in table view:

<b>FMC\ mobile EPG</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
①	O	O		O	
②			O		O
③			O		O
④		O	O	O	O
⑤	O				
⑥		O	O	O	O
①	O				
②			O		O
③			O		
④			O		O
⑤			O		
⑥			O		O
I	O				

### 13 Scenario for N-screen service Case III Scenario 3: ASMD

#### 13.1 General description: Adaptive source multi-device (ASMD)

Adaptive source multi-device (ASMD) is a collaborative case of N-screen service. The concept of the collaborative case of N-screen is the existence of collaboration among multi-screens showing different contents or services on each screen. The ASMD adds a content/service adaption concept along with the collaboration. For example, if a user watching TV reads content-related news using his mobile phone, he may transfer the news to the big TV screen to share it with his family. Because the size and resolution is different between the TV and mobile phone, proper adaption needs to be done with the service presentation.

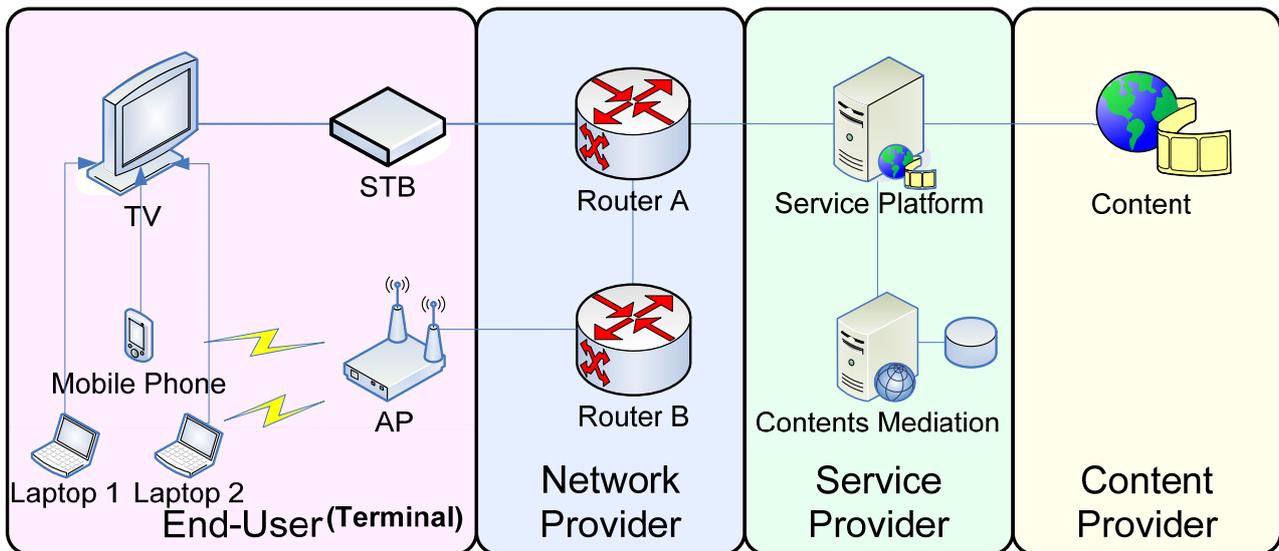


Figure 13-1 – Overall configuration of N-screen case ASMD

## 13.2 Service scenario and mapping: ASMD

### 13.2.1 Service scenarios of N-screen service Case III collaborating: ASMD

1. **[Service Provider > End user (person): watching TV programme (baseball) on Terminal A (big screen TV)]**

Users 1, 2 and 3 (3 persons) are watching a TV programme on Terminal A (big-screen TV) provided by content delivery functions of a service provider via network functions of a network provider.

2. **[Service Provider > End user (person): using service on terminal]**

Users 1, 2 and 3 (three persons) are using services on their own handheld device (Terminals B, C and D). The services are related with the TV programme shown on Terminal A (big-screen TV). For example, User 1 watches a multi-angle scene of the baseball game on his smartphone; User 2 watches a short news item about the baseball game on his tablet; and User 3 uses the baseball-game statistics service.

3. **[End user (person) → Service provider: Request for sending services to Terminal A]**

End user functions of the end user request their own Terminals B, C and D to transfer current service to Terminal A to discuss the game by watching each person's service together. The requested N-screen service is to display the combined contents of the services of Terminals B, C, and D. The N-screen service control function receives the request.

4. **[Service provider: Preparing N-screen service for Terminal A]**

The N-screen service control functions of the service provider adjust the quality of services to fit the capabilities of different terminals. The application function receives adapted content from service control function then sends it to Terminal A using the collaboration function of the N-screen service control function.

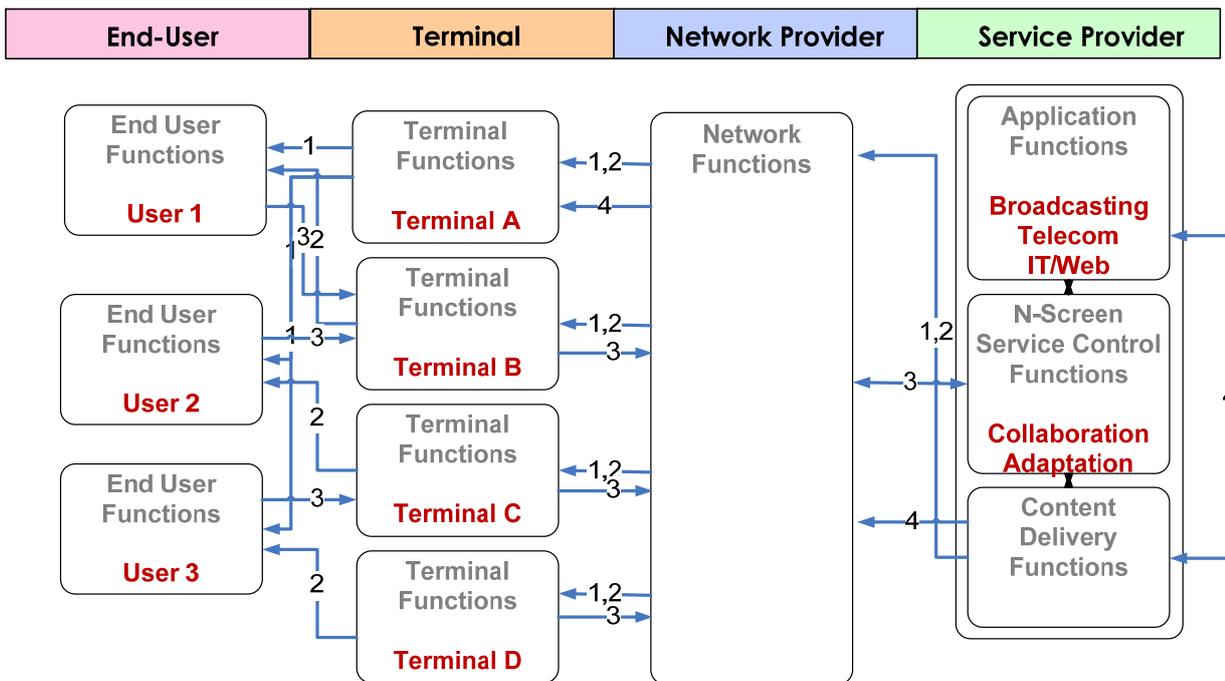


Figure 13-2 – Service scenario of ASMD; N-screen collaborative case

### 13.2.2 Mapping ASMD N-screen scenarios with FMC scenarios

The following are mappings of service scenarios of N-screen Case III: N-screen ASMD service scenarios and FMC scenarios described in clause 8.2 of [ITU-T Y-Sup.14]. These mappings help to identify features of each scenario and the details for supporting N-screen service Case III: ASMD service to separate terminal over FMC.

- FMC Scenario ①: N-screen service Case III (ASMD) Scenario 1, 2, 3, 4
- FMC Scenario ⑥: N-screen service Case III (ASMD) Scenario 3
- FMC Scenario ④: N-screen service Case III (ASMD) Scenario 1, 4
- FMC Scenario ⑤: N-screen service Case III (ASMD) Scenario 2, 3
- FMC Scenario ⑦: N-screen service Case III (ASMD) Scenario 1, 4
- FMC Scenario ③: N-screen service Case III (ASMD) Scenario 2
- FMC Scenario I: N-screen service Case III (ASMD) Scenario 1, 2
- FMC Scenario II: N-screen service Case III (ASMD) Scenario 4

Mapping in the view of N-screen service Case III (ASMD) Scenario:

- N-screen service Case III (ASMD) Scenario 1: FMC Scenario I, ④, ①
- N-screen service Case III (ASMD) Scenario 2: FMC Scenario I, ③, ①
- N-screen service Case III (ASMD) Scenario 3: FMC Scenario ①, ⑥, ⑤
- N-screen service Case III (ASMD) Scenario 4: FMC Scenario II, ⑦, ④, ①

Mapping in table view:

<b>FMC\ASMD</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
①	O	O	O	O
⑥			O	
Ⓐ	O			O
Ⓑ		O	O	
Ⓐ	O			O
Ⓒ		O		
I	O	O		
II				O

#### **14 Security considerations**

This supplement conforms to [ITU-T Y.2701] for security aspects. No specific security considerations have been identified.

# Appendix I

## Overall scenario model over FMC

[ITU-T Y-Sup.14] describes an overall scenario model for various services over FMC. In the overall scenario model shown in Figure I.1, the red dotted box describes an N-screen service scenario situation of an end user using his/her terminal devices while the features of the service are operated on several devices synchronously. An example is the case of displaying the same content quality on different types of terminals by converting content quality. Another scenario is of an end user using his/her terminal devices while the unit feature of converged service is operated on separate devices synchronously. Examples of this are the cases of displaying VOD on TV+STB, starting VOD using EPG displayed on mobile phone, and displaying VOD related information on a Notebook.

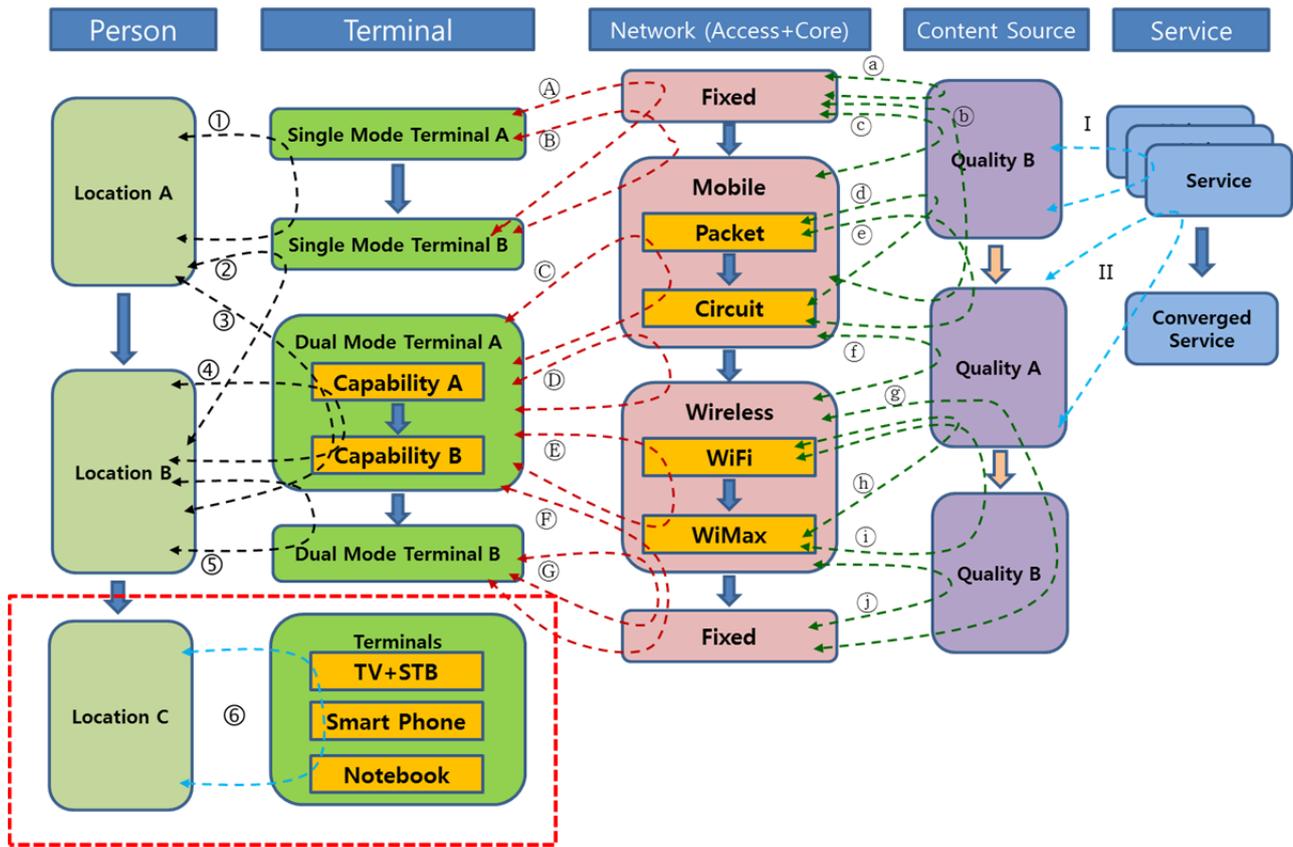


Figure I.1 – N-screen part of an overall scenario model for FMC

## Appendix II

### N-screen construction type models

This appendix summarizes the N-screen construction model of players based on platform, device, discrete and hybrid types.

#### II.1 Platform type

The platform type of N-screen construction provides the same content to multiple devices, such as TV, PC and mobile devices, through one three-screen service platform as shown in Figure II.1.

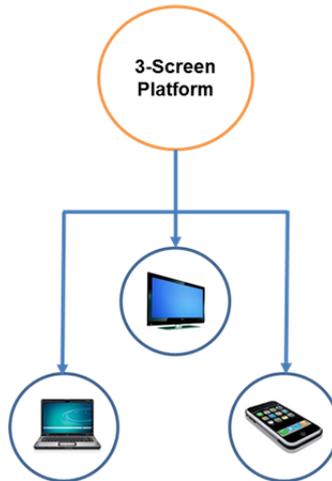


Figure II.1 – Platform type of N-screen construction model

#### II.2 Device type

The device type of N-screen construction provides content or service to multiple devices such as TV, PC and mobile devices through content or service sharing among devices as shown in Figure II.2.

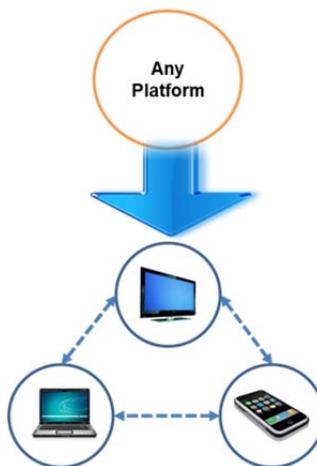
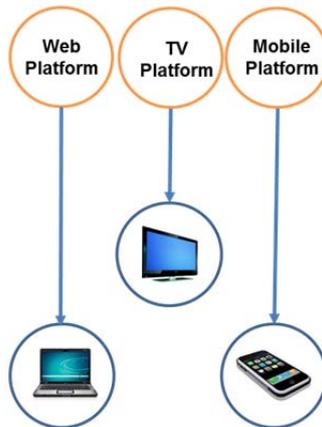


Figure II.2 – Device type of N-screen construction model

### II.3 Discrete type

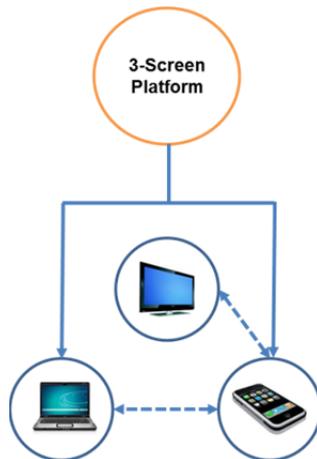
The discrete type of N-screen construction provides separate content to multiple devices such as TV, PC and mobile device through separate service platforms, as shown in Figure II.3.



**Figure II.3 – Discrete type of N-screen construction model**

### II.4 Hybrid type

The hybrid type of N-screen construction provides contents or services to multiple devices such as TV, PC and mobile device through a combination of service platform and networking between devices as shown in Figure II.4.

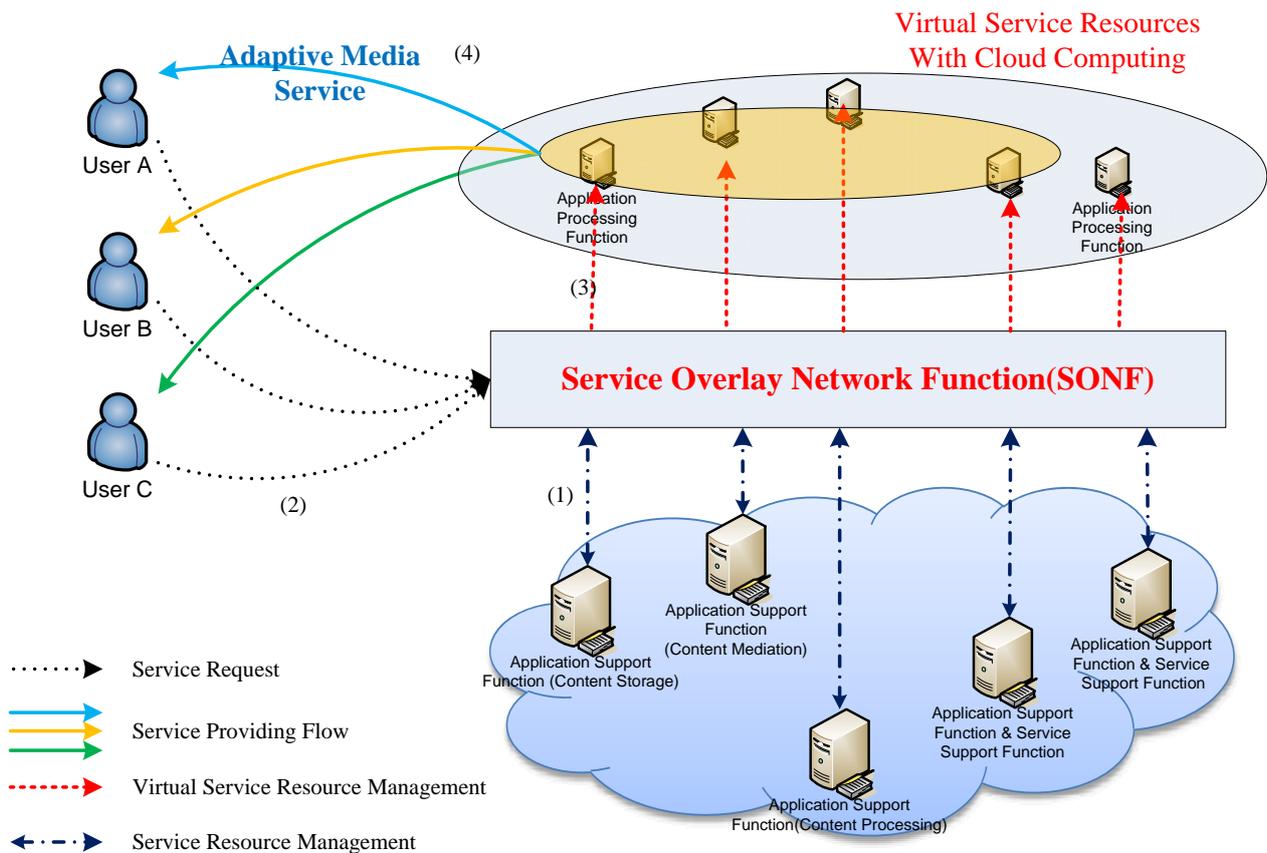


**Figure II.4 – Hybrid type of N-screen construction model**

## Appendix III

### Example of system model using ITU-T Y-Sup.17 for the cloud-based N-screen service

This appendix provides an example of a system model using [ITU-T Y-Sup.17] for a cloud computing-based N-screen service. In [ITU-T Y-Sup.17], the service overlay network function (SONF) aims to provide an easy and quick deployment of service-specific logical networking functions which can be used to complement the services provided by transport networks. Consequently, the SONF can help to support dynamic service orchestration using the cloud computing service for N-screen service.



**Figure III.1 – Example of a SONF system model using the cloud service for the N-screen service**

- 1) The SONF with cloud computing capability manages service computing resources such as networks, servers, storage, application, converting, delivery and services to compose a canvas-like service orchestration. It can be rapidly provisioned and released with a minimum of management effort and service provider interaction.
- 2) The end user asks the service provider for an N-screen service that can support the SONF with cloud computing service capability.
- 3) The SONF creates a new N-screen service using a cloud computing capability based on the characteristics of the service request from end users.
- 4) End users can watch adjusted contents considering display size and use additional services related to the content provided by the SONF using the cloud computing capability.

## Bibliography

- [b-IEEE 802.11B] IEEE 802.11B (1999), *IEEE Standard for Local and Metropolitan Area Networks – Specific requirements – Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications.*
- [b-IEEE 802.16e, 802.16m] IEEE 802.16e (2005), IEEE 802.16m (2010), *IEEE Standard for Local and Metropolitan Area Networks – Part 16: Air Interface for Fixed and Mobile Broadband Wireless Access Systems.*





## SERIES OF ITU-T RECOMMENDATIONS

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